

Document made available under the Patent Cooperation Treaty (PCT)

International application number: PCT/GB04/005111

International filing date: 07 December 2004 (07.12.2004)

Document type: Certified copy of priority document

Document details: Country/Office: GB
Number: 0329205.9
Filing date: 17 December 2003 (17.12.2003)

Date of receipt at the International Bureau: 24 January 2005 (24.01.2005)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b)



World Intellectual Property Organization (WIPO) - Geneva, Switzerland
Organisation Mondiale de la Propriété Intellectuelle (OMPI) - Genève, Suisse



GB 04/5111

INVESTOR IN PEOPLE

The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP10 8QQ

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

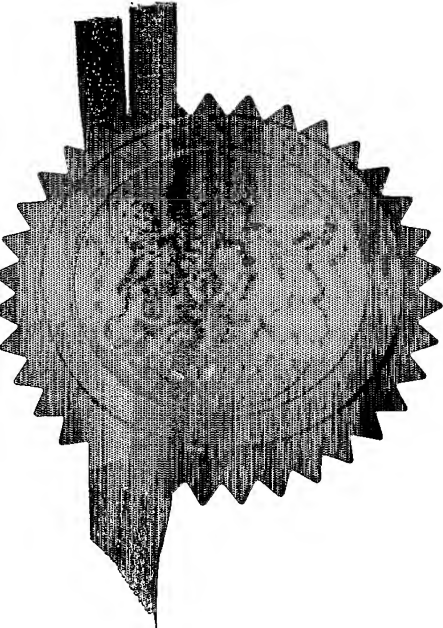
Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.

Signed

Andrew Gersey

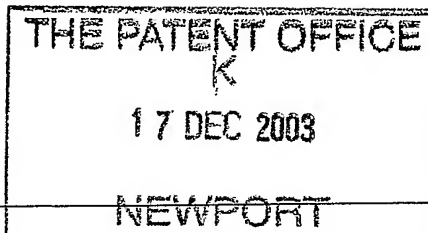
Dated

10 January 2005



Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)



The Patent Office

Cardiff Road
Newport
South Wales
NP9 1RH

1. Your reference
P104302GB

2. Patent application number
(The Patent Office will fill in this part)

17 DEC 2003

0329205.9

3. Full name, address and postcode of the or of each applicant (underline all surnames)
Morton GRAHAM
5 Parkway
Westhoughton
BOLTON
Lancashire BL5 2RY

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

UNITED KINGDOM

7856 255001

4. Title of the invention
AN ILLUMINATION DEVICE

5. Name of your agent (if you have one)

HARRISON GODDARD FOOTE

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)
ORLANDO HOUSE
11C COMPSTALL ROAD
MARPLE BRIDGE
STOCKPORT
SK6 5HH

Patents ADP number (if you know it)

14571002

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number
(if you know it)

Date of filing
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

- a) any applicant named in part 3 is not an inventor, or
 - b) there is an inventor who is not named as an applicant, or
 - c) any named applicant is a corporate body.
- See note (d))

NO

Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form	0
Description	8
Claim(s)	0
Abstract	0
Drawing(s)	1 + 1 <i>rel</i>

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

Request for preliminary examination and search (*Patents Form 9/77*)

Request for substantive examination (*Patents Form 10/77*)

Any other documents
(*please specify*)

11. I/We request the grant of a patent on the basis of this application.

Signature	Date
<i>Harrison Goldard Foote</i>	16/12/2003

12. Name and daytime telephone number of person to contact in the United Kingdom
- | | |
|-------------|---------------|
| MIKE AJELLO | 0161 427 7005 |
|-------------|---------------|

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

- If you need help to fill in this form or you have any questions, please contact the Patent Office on 0645 500505.
- Write your answers in capital letters using black ink or you may type them.
- If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.
- If you have answered 'Yes' Patents Form 7/77 will need to be filed.
- Once you have filled in the form you must remember to sign and date it.
- For details of the fee and ways to pay please contact the Patent Office.

AN ILLUMINATION DEVICE

THIS INVENTION concerns illumination devices which may be used for highlighting an object such as a building for aesthetic or advertising purposes or for providing illuminated signs. Conventional products for these purposes such as neon or fluorescent lighting require considerable electrical power in operation and in the case of neon lighting a high voltage is required often in the region of several Kilovolts of electricity which has implications both for safety and economy. Furthermore, such products tend to be inefficient in the distribution of light resulting in highlights and dim spots giving an aesthetically unattractive appearance.

An object of the present invention is to provide an illumination device providing substantially uniform light output with minimal power consumption.

According to the present invention there is provided an illumination device comprising a first elongate translucent member, an LED light source located at least at one end or edge of the member to pass light into and along the member, a second translucent member arranged in superimposed relationship with the first translucent member thus to define a

gas space therebetween; characterised by a surface formation on the first translucent member causing it, in use, to function as a leaky wave guide allowing light to escape into the gas space for secondary diffusion therein, the second translucent member thus being adapted to pass the secondarily diffused light externally thereof.

The first translucent member may be a rod, and the second translucent member a tube surrounding the rod and defining the gas space therebetween.

The rod may have an undulating surface.

The rod may be of circular cross-section.

The rod may be of elliptical cross-section.

The LED light source may comprise separate light sources disposed at opposite ends respectively of the rod.

A reflector may be disposed on a part of the surface of the first translucent member within the gas space.

The first translucent member may be of an acrylic or polycarbonate material.

The second translucent member may be of an acrylic or polycarbonate material.

Support means may be provided in the gas space to maintain a predetermined spacial relationship between the first and second translucent members.

An embodiment of the invention will now be described, by way of example only, with reference to the accompanying schematic drawings, in which:-

Fig. 1 is a transverse cross-sectional view of an illumination device made in accordance with the invention;

Fig. 2 is a side elevation of a part of the illumination device of Fig. 1;

Fig. 3 is a schematic side elevation of the device of Fig. 1;

and Fig. 4 is a view similar to Fig. 1 illustrating an additional but optional feature.

It is known that if light is transmitted into a translucent rod, for example of an acrylic or polycarbonate material, having substantially total internal reflection, the light is transmitted down the length of the rod but is invisible when viewed externally. Any imperfections in the surface of the rod will allow light to escape but at a very shallow angle with respect to the surface of the rod. If the imperfection is in the form of a scratch then the light will tend to be transmitted almost perpendicular to the surface of the rod.

The illumination device to be described utilises a rod of such a material but wherein the surface imperfection is predetermined such as to permit light to escape from the surface of the rod to a controlled degree as will be described.

Referring now to the drawings, the illumination device comprises an acrylic or polycarbonate rod 10 which has a wavy or undulating surface as shown, in exaggerated form, in Fig. 2. Thus, when light is injected into the end of the rod as will be described, the rod behaves as a leaky wave guide allowing light to escape from its surface at a very shallow angle.

The rod is of circular cross-section and is concentrically disposed within an outer translucent cover 11 which is of sufficiently larger diameter than the rod 10 to define, between them, a gas space 12. The cover 11 may be of an acrylic or polycarbonate material.

The rod 10 is provided with a predetermined undulating surface illustrated in exaggerated form at 13 in Fig. 2. The effect of the undulating surface is to allow light to escape from the rod but at a very shallow angle to the surface since there is no sharp disruption to the surface. Within the gas space 12 the leaked light is secondarily diffused and in effect mixed to a uniform distribution of light within the space. The tube 11 then captures this light and transmits it outwardly transverse to the axis of the device to provide a visually uniform light along the length of the device. This light is then visible from any angle with respect to the outer surface of the tube 11 thus to give the overall impression of the uniformly illuminated rod.

As shown in Fig. 1, the rod 10 is supported within the tube 11 by spaced ribs 16 which may be integrally formed with the tube and maintain a uniform gap between the tube and

the rod. Thus, with the rod supported concentrically within the tube, lamp units illustrated at 14 in Fig. 3 are sealingly applied to the ends of the rod and tube respectively, the units 14 enclosing an array of LED's which thus project light into the rod 10.

An illumination device of this kind affords a considerable saving in electrical energy when compared with conventional systems. Typically, neon lighting requires 23 watts of electricity per metre and even an efficient LED system would utilise perhaps 6 watts per metre. The increase in efficiency in distributing the light using the concept of a leaky wave guide within a tube with a gas space between them provides a system which may be operated at around 1 watt per metre with equivalent light output.

The gas space is preferably filled with air thus avoiding the potentially harmful properties of phosphors and the like such as are used in neon and fluorescent tubes. The LED lighting units 14 may be supplied with low voltage power in the region of 10 volts thus further increasing the safety aspects of the present invention.

Referring now to fig. 4, in an alternative embodiment there is provided a reflective strip 15 passing along the length of the leaky wave guide or rod 10 and in surface contact therewith so as to concentrate the light primarily in one direction whilst still creating uniformly distributed light within an angle generated by the width of the reflector strip 15. This may serve to prevent so-called light pollution by illuminating only the surrounding area required to be illuminated. For example, if an illumination device of this kind is mounted on the wall of a building, the light is seen when approaching the building but does not illuminate the wall itself. By careful selection of the position of the reflector 15, the beam of visible light may be directed where specifically required.

If it is required to produce a line of light of several metres in length then several such illumination devices may be mounted end-to-end. Each LED lamp unit 14 may have a translucent cover so that in an assembly of several such devices in end-to-end alignment, there is substantially no loss of illumination between the devices thus giving the impression of a continuous line of light. This is particularly useful where devices of this kind are used to highlight architectural features such as the outline of a building or roof. Electrical connection to each device may be at one end of the device with conductors

passing along the device to the other end through the gas space
12.

Such devices may be used for advertising or for highlighting, by illumination, areas or equipment for safety and to increase visibility from a distance. Another use for the device is for the illumination of rooms or corridors within buildings with low levels of light, typically as may be required for emergency lighting and may be used to provide energy savings where high levels of lighting are not required. However, it may be possible to introduce sufficient light energy into the device for it to serve as general ambient lighting and the illumination of a space.

